REMARKS

Upon entry of this amendment, claims 1-24 will be pending. Independent claims 1, 3, 8, 13, 15, and 17 have been amended to make the clarifications requested by Examiner Dunham during a telephonic interview with Applicants and Applicants' undersigned representative. Also, claims 19-24 have been added to specify the specific nature of the claimed "variable statistical parameters" and the claimed "other variable parameters." Support for the new claims may be found in the specification at paragraphs [0031], [0038], [0045], and [0062]. No new matter has been introduced by these amendments. Entry of the amendments and reconsideration of the rejections is requested.

Summary of Telephonic Interview and Explanation of Proposed Amendments

Applicants appreciate the courtesies extended by Examiner Dunham during a telephonic interview with Applicants and Applicants' undersigned representative on January 23, 2007. The Final Rejection was discussed in detail and arguments were presented for overcoming the outstanding rejections. The Examiner agreed to reconsider the claims if amended to recite the step of generating a delivery route based on variable information in order to distinguish these claims from the *a priori* routing taught by Benda. The claims have been amended herein to reflect such changes. In particular, the claims have been amended to recite that the "integrated inventory replenishment, scheduling and routing system … generates a delivery route for a commercial delivery vehicle based on said statistical parameters and other variable parameters including road routing economics of making several deliveries in sequence before replenishment of the commercial delivery vehicle," where the statistical parameters are "variable" and the "other variable parameters" may include, by way of example only, the following parameters:

- Routing horizon, safety (lead time) horizon , long-term horizon (para. [0031]);
- Degree-day forecast, last delivery specification, and forecasting parameters. Overall planning horizon is defined as the sum of all three horizons (para. [0032]);
- ODD (optimal delivery day) (para. [0033]);
- [selection] every customer for whom the cost trade-off function reaches its minimum (ODD) within the planning horizon is selected for routing (para. [0033]);

- [Priority] all customers whose ODD fall within the long-term horizon should be assigned a lower priority (para. [0033]);
- selection depends on the level of geographical and operational constraints (para. [0034]);
- range-of-allowable-days (RAD) (para. [0036]);
- RAD constraints [defined as] a string of pre-determined symbols [associated with each order] … These [routing] strings indicate the days of the routing horizon on which a customer can be delivered (para. [0043]); and
- At the end of this string matching process each truck will be associated with a set of routing strings (para. [0046].

New claims 19 and 20 also identify the nature of the claimed parameters. Entry of the claim amendments and reconsideration and allowance of the present application are requested.

The remainder of this response will serve as a summary of the discussion amongst the parties during the telephonic interview.

Rejection Under 35 U.S.C. §102(e)

Claims 1-18 stand finally rejected under 35 U.S.C. §102(e) as allegedly being anticipated by Benda et al. (US 6,937,992) ("Benda"). This rejection is respectfully traversed.

As noted in the previous response, the system disclosed by Benda is quite different from that claimed. The objective of Benda is to assure that truck capacity is fully utilized before a truck is dispatched to a single (or at most two) customers in need of a number of commodities sourced originally from many different locations. On the other hand, the claimed invention relates to the routing of already full trucks of a single commodity from a single (or at most a few locations) to 15 to 30 destinations in a local area within in one or more delivery days so as to minimize the time taken to deliver that commodity. This difference of objectives leads to very different operational environments and technical solutions.

Exemplary claim 1, as amended, relates to a scheduling and routing system for delivering a consumable to customers via commercial delivery vehicles. Such a system comprises:

> a delivery forecasting system that maps certain customers to delivery profiles for similarly situated customers to provide variable statistical parameters for inventory replenishment of the consumable; and
>
> an integrated inventory replenishment, scheduling and routing system that generates a delivery route for a commercial delivery vehicle based on said statistical parameters and other variable parameters including road routing economics of making several deliveries in sequence before replenishment of the commercial delivery vehicle.

As noted during the interview, the teachings of Benda do not relate, *inter alia*, to a system including a "delivery forecasting system" and an "integrated inventory replenishment, scheduling and routing system that generates a delivery route for a commercial delivery vehicle based on said statistical parameters and other variable parameters including road routing economics of making several deliveries in sequence before replenishment of the commercial delivery vehicle" as now claimed.

On the contrary, as noted in the previous response and during the interview, Benda uses Cross Docking Facilities (CD) to accept nearly full loads of merchandise on many trucks from manufacturers and/or distribution centers. At the cross dock, the merchandise is reorganized and/or commingled such that similarly destined merchandise are placed on the same vehicle and sent to the ultimate customer (Benda, col. 7-lines 31-34). The essential operational characteristic is a multi-commodity two-stage transportation process where the objective is to assemble single stop shipping plans between manufacturer- suppliers to an intermediary CD location and single stop shipping plans between the CD and a ultimate customer location. The geographical setting may be regional or national thereby restricting the number of stops a truck makes before returning for another load. Since there are at most one or two stops involved, the sequencing of stops to reflect travel times is not the issue and indeed the optimization techniques proposed by Benda consider the costs of transportation as predetermined. In other words, Benda do not provide a "delivery forecasting system" and such a system is not needed to handle the delivery to the one or two locations contemplated by Benda. Moreover, Benda discusses monitoring but not estimating stock-on hand and the delivery requirements to satisfy a number of inventory needs including safety stock (Benda, col. 8 lines 9-14 and 41-44). Benda does not provide an integrated system that integrates inventory replenishment, scheduling and routing as claimed. On the contrary, the demands determined by Benda are used to trigger delivery requirements that are assumed fixed in the Benda optimization technique. As previously noted, while Benda addresses the problem of keeping trucks full for deliveries, Benda does not address the problem of routing already full trucks of a single commodity so as to minimize the time and cost to deliver that commodity.

Rebuttal to Examiner's Arguments

In the "Response to Arguments" section on pages 5-6 of the Final Rejection, the Examiner rebutted Applicant's arguments in the response to the first Official Action by reminding Applicant that a "recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art." The Examiner reiterated this during the interview. For the reasons to follow, Applicants submit that the amended claims clearly support the arguments presented herein and that the structure taught by Benda operates in an entirely different manner than the claimed structure of a "delivery forecasting system" and an "integrated inventory replenishment, scheduling and routing system." Moreover, the system taught by Benda does *not* perform the "intended use" of the claimed apparatus. The claimed structure and method is not taught by Benda for any "intended use."

To frame the following discussion, Applicants will distinguish two categories of systems that address vehicle routing: those that use fixed routes and those that dynamically generate routes.

In the first instance, a network of nodes (destinations) is predetermined and *a priori* grouped into a number of "routes" that uniquely connect subsets of those nodes. For example, the Greyhound bus network has a number of fixed routes (see http://www.greyhound.com/locations/routemap.pdf) over which they try to maximize their bus utilization. Similarly, Benda seeks to maximize truck capacity utilization over a pre-determined set of routes (Column 11, lines 62-67). As noted during the interview, Benda does not generate any routes, particularly not routes based on variable parameters as now claimed.

In the latter instance, a set of nodes and their associated demand is defined without any *a priori* route structure. The challenge at hand is then to identify how to assign vehicles with known capacity to traverse sequences of nodes in a way that minimizes time on the road given known demand and vehicle capacity. For example, the airport door-to-door van services must dynamically select a route that delivers customers to their destinations in minimum time without exceeding the van capacity or availability. The claimed invention falls into this category.

These two problems require totally different algorithmic approaches and one method cannot be used in place of or suggest the other. The Examiner has not given weight to applicant's distinguishing comments regarding these systems, arguing that the noted distinctions are not set forth in the claims. Applicants have amended the claims to address the Examiner's comments. The distinctions between such systems will be addressed below in the context of the amended claims.

The Examiner argues that Benda anticipates the system of claim 1 "because 'making several deliveries in sequence before replenishment of the commercial delivery vehicle' is interpreted to mean at least 2 deliveries (which the applicant admits Benda teaches), which by definition must be in sequence, and then refilling the truck to optimize the timing of the next delivery." To support that rejection the examiner cites Benda Column 6, line 62 – column 7, line 9:

> Thus, in its simplest form, maximization of vehicle capacity compares the maximum vehicle capacity measured against the capacity requirements associated with the merchandise initially ordered. The subtraction of these measurements yields the amount of unused capacity. Thus, new merchandise may be added sufficient to fill up this unused capacity. This creates maximum or substantially maximum vehicle capacity. In any embodiment, though, the invention can be modified to manage multi-pickup and multidrop-off shipments, as well as shipments that travel between cross-docks. Per the invention, filling a vehicle can be done iteratively (while the vehicle is being loaded); or can be filled in advance by manipulating the order sequence of order generation and/or vehicle optimization, before the goods are finally ordered.

In regard to optimizing the timing of the next delivery, Applicants respectfully disagree with the Examiner's analysis as this citation only pertains to the opportunistic loading of a truck to maximize truck utilization (see supporting example Benda, Column 7 lines 37-57) without regard to any optimization of stop sequencing and timing. On the other hand, the claims are clearly concerned with optimal stop sequencing and timing (e.g., claim 1 recites: "road routing economics of making several deliveries in sequence before replenishment of the commercial delivery vehicle;" *see also* claims 2, 4, and 5) and the generation of delivery routes. Applicants further note that the very structure of the multistage transshipment problem that Benda claims best represents his invention (Column 11, lines 20-22), has long been recognized by those skilled in the art as being unsuited to optimization of deliveries sequenced over time. Attempting to do so with a transshipment formulation presents an intractable combinatorial modeling formulation in order to specify the connectivity and precedence conditions between the arcs connecting the nodes. For that reason, these route conditions are not reflected in the Benda specification. In contrast, the claimed system and method is indifferent to the number of stops and will generate optimal routes strictly predicated on geography and delivery performance regardless of the scale of the connectivity and precedence network. Benda provides no teaching of an "integrated inventory replenishment, scheduling and routing system that generates a delivery route for a commercial delivery vehicle based on said variable statistical parameters and other variable parameters including road routing economics of making several deliveries in sequence before replenishment of the commercial delivery vehicle" as now claimed.

In regard to the Examiner's argument that Benda contemplates deliveries being in sequence because Benda contemplates deliveries to 2 customers, Applicants strongly disagree with the Examiner's conclusion that Benda suggests a delivery system for scheduling deliveries. Clearly, a system for scheduling deliveries to "several deliveries in sequence" is not contemplated or required in any way when only one or two destinations are contemplated (see Summary of the Invention, Column 4, lines 9-39) and, in any case, no route design mechanism is provided by Benda. Applicants respectfully disagree with the Examiner's suggestion to the contrary because the way Benda's sequences of stops are generated do not support the Examiner's analysis. Benda teaches that to generate sequences of stops he uses *a priori* ordered lists associated with pallets and trucks (which he refers to as "routes" over a "fully connected network of nodes N" – column 11, lines 58-67). Benda then proceeds to assign shipments to segments of these "routes" through sorting or integer programming. Therefore, these stops are sequenced according to the *a priori* defined "routes." In effect, not unlike Greyhound Bus, Benda's system works with *a priori*, externally established "routes" from which particular segments are selected for profit maximization. Benda makes no mention of any modification to the *a priori* routes as part of his optimization method to make "several deliveries in sequence" as claimed.

In contrast, the claimed system and method does not rely on *a priori* sequences but dynamically construct routes in local delivery settings from variable data where very large numbers of routing alternatives are available. These sequences are generated as delivery routes that minimize the overall costs and include road routing economics and delivery efficiencies that systematically yield better solutions than *a priori* routes would provide in those settings. The point of differentiation is therefore the optimality of the generated delivery route over "several deliveries in sequence" using "road routing economics," not the fact that 2 or more stops are "by definition" in sequence over *a priori* routes.

In regard to the number of deliveries being made, Applicants note that the Examiner states that Benda's invention can make multidrops, and indeed he can do so but only along predetermined routes. Therefore, even if Benda were to attempt to achieve routing efficiencies as in the claimed method and apparatus, he would have to have available an optimal route solution (such as one derived using the claimed system and method) before his method could be employed. Benda provides no teachings of such an optimal route solution.

In the Final Rejection, the Examiner further states: "the applicant further argues that the invention involves 'probability inventory models' and 'heuristic optimization techniques' but that "these models are not claimed." Applicants disagree. Claim 1, for example, recites "[a] delivery forecasting system that maps certain customers to delivery profiles for similarly situated customers to provide variable statistical parameters for inventory replenishment of the consumable" that refers to the pattern recognition methods using original clustering and matching procedures set forth in paragraph 58 through 61 of the specification. While this pattern recognition procedure does make use of tokens (i.e., customers) whose consumption parameters are derived with unclaimed methodologies such as Box-Jenkins and regression (paragraph 57 of the specification), Applicants note that these limitations need not be included in the claims as Benda does not teach any forecasting methodology at all. In contrast, Benda's system may only "be configured to *monitor* … any promotional stock needed, stock needed for seasonal demand, forecasts of stock demand" (Benda Column 8, lines 9 –15).

Claim 1 specifically refers to the heuristic program that controls the execution of a commercially available optimal vehicle routing (OVR) and exploits the information provided by these packages. The logic of this heuristic program essentially manages the selection of deliveries predicated on delivery date estimates, determines the ranges of dates that are acceptable for deliveries so as to minimize delivery cost, while satisfying customer delivery priorities (Paragraph 30 through 48 with respect to Figures 2-4 of the specification) using the "road routing economics" such as distances and road speeds that are provided by any commercially available OVR packages. In contrast, Benda does not teach any sequencing of stops beyond defining *a priori* routes as sequences of ordered stops without reference to any "road routing economics" or any other characteristics from which a route for "making several deliveries in sequence before replenishment of the commercial delivery vehicle" may be determined.

Thus, as noted in the previous response, the claimed method and system implements a single stage transportation process that does not involve Cross Docking as taught by Benda. The present invention optimizes delivery schedules by integrating inventory replenishment with the "road routing economics" provided by conventional OVR packages so that trucks that typically make 15 to 30 stops in a local area within in a day or so possibly returning to reload once or twice before the end of the workday may use an optimized delivery route. In accordance with the claimed system and method, the stop sequence optimization considers geographic and inventory replenishment concurrently. This is accomplished by having the optimization consider both "cost minimization for inventory replenishment of the consumable for individual deliveries by a commercial delivery vehicle" and "road routing economics of making several deliveries in sequence before replenishment of the commercial delivery vehicle" as claimed to determine the timing of a delivery. Such a technique is not taught by Benda. Withdrawal of the rejection of claims 1-18 in view of the teachings of Benda is thus appropriate and is respectfully solicited.

Summary of Arguments

To summarize, the teachings of Benda address a different delivery problem and do not provide any teachings particularly relevant to the claimed delivery forecasting system and method that "maps certain customers to delivery profiles for similarly situated customers to provide variable statistical parameters for inventory replenishment of the consumable" or to an "integrated inventory replenishment, scheduling and routing" system and method that "generates a delivery route for a commercial delivery vehicle based on said statistical parameters and other variable parameters including road routing economics of making several deliveries in sequence before replenishment of the commercial delivery vehicle.” Benda does not deal with such a sequential delivery scheduling problem involving “making several deliveries in sequence before replenishment” and provides no relevant teachings to solving this problem. Hence, Benda does not teach or suggest the claimed functionality or “intended use” or the claimed method and apparatus for providing such functions or “intended use” as the Examiner suggests.

The rejection of claims 1-18 as being anticipated by Benda is improper and withdrawal of this rejection is respectfully requested. Allowance of new dependent claims 19-24 is appropriate for the same reasons.

Conclusion

The present response is believed to obviate the prior art rejection of record. Entry of the above amendments and issuance of a Notice of Allowability are respectfully requested.

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